

## PATENT COOPERATION TREATY

**PCT**  
**NOTIFICATION OF ELECTION**  
**(PCT Rule 61.2)**

From the INTERNATIONAL BUREAU

To:

Commissioner  
 US Department of Commerce  
 United States Patent and Trademark  
 Office, PCT  
 2011 South Clark Place Room  
 CP2/5C24  
 Arlington, VA 22202  
 ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 20 November 2000 (20.11.00)	
International application No. PCT/EP99/01721	Applicant's or agent's file reference FH990302PCT
International filing date (day/month/year) 16 March 1999 (16.03.99)	Priority date (day/month/year)
Applicant EBERLEIN, Ernst et al	

1. The designated Office is hereby notified of its election made:

in the demand filed with the International Preliminary Examining Authority on:

13 September 2000 (13.09.00)

in a notice effecting later election filed with the International Bureau on:

\_\_\_\_\_

2. The election  was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland  Facsimile No.: (41-22) 740.14.35	Authorized officer  C. Cupello  Telephone No.: (41-22) 338.83.38
---	--

## PCT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING  
OF A CHANGE(PCT Rule 92bis.1 and  
Administrative Instructions, Section 422)

Date of mailing (day/month/year) 20 November 2000 (20.11.00)
Applicant's or agent's file reference FH990302PCT
International application No. PCT/EP99/01721

From the INTERNATIONAL BUREAU

To:

SCHOPPE, Fritz  
Schoppe, Zimmermann & Stöckeler  
P.O. Box 71 08 67  
81458 Munich  
ALLEMAGNE

## IMPORTANT NOTIFICATION

International filing date (day/month/year) 16 March 1999 (16.03.99)
--

## 1. The following indications appeared on record concerning:

the applicant  the inventor  the agent  the common representative

Name and Address SCHOPPE, Fritz Patentanwälte Schoppe & Zimmermann Postfach 71 08 67 D-81458 München Germany	State of Nationality	State of Residence
	Telephone No.	
	089/790 44 50	
	Facsimile No.	
	089/790 22 15	
	Teleprinter No.	

## 2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

the person  the name  the address  the nationality  the residence

Name and Address SCHOPPE, Fritz Schoppe, Zimmermann & Stöckeler P.O. Box 71 08 67 81458 Munich Germany	State of Nationality	State of Residence
	Telephone No.	
	089/790 44 50	
	Facsimile No.	
	089/790 22 15	
	Teleprinter No.	

## 3. Further observations, if necessary:

The new agent's address on the Demand has been considered as a change under Rule 92bis. In case of disagreement, the International Bureau should be notified immediately.

## 4. A copy of this notification has been sent to:

<input checked="" type="checkbox"/> the receiving Office	<input type="checkbox"/> the designated Offices concerned
<input type="checkbox"/> the International Searching Authority	<input checked="" type="checkbox"/> the elected Offices concerned
<input checked="" type="checkbox"/> the International Preliminary Examining Authority	<input type="checkbox"/> other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer C. Cupello Telephone No.: (41-22) 338.83.38
---	--

## PATENT COOPERATION TREATY

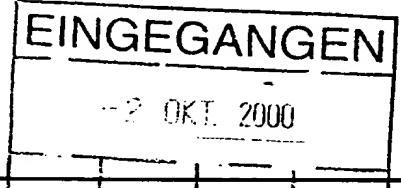
PCT

NOTICE INFORMING THE APPLICANT OF THE  
COMMUNICATION OF THE INTERNATIONAL  
APPLICATION TO THE DESIGNATED OFFICES

(PCT Rule 47.1(c), first sentence)

From the INTERNATIONAL BUREAU

To:

SCHOPPE, Fritz  
Patentanwälte Schoppe & Zimmermann  
Postfach 71 08 67  
D-81458 München  
ALLEMAGNE

Date of mailing (day/month/year) 21 September 2000 (21.09.00)		
Applicant's or agent's file reference FH990302PCT		
International application No. PCT/EP99/01721	International filing date (day/month/year) 16 March 1999 (16.03.99)	Priority date (day/month/year)
Applicant FRAUNHOFER-GESELLSCHAFT ZUR FÖRDERUNG DER ANGEWANDTEN FORSCHUNG E.V. et al		

## IMPORTANT NOTICE

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:  
US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:  
CA,EP,GB,IN,JP

The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on 21 September 2000 (21.09.00) under No. WO 00/55996

## REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a demand for international preliminary examination must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

## REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the national phase, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer J. Zahra
Facsimile No. (41-22) 740.14.35	Telephone No. (41-22) 338.83.38

## PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

To:

SCHOPPE, Fritz  
 Schoppe, Zimmermann & Stöckeler  
 P.O. Box 71 08 67  
 81458 Munich  
 ALLEMAGNE

Date of mailing (day/month/year)	
20 November 2000 (20.11.00)	

Applicant's or agent's file reference	
FH990302PCT	

International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/EP99/01721	16 March 1999 (16.03.99)	
<b>Applicant</b> <b>FRAUNHOFER-GESELLSCHAFT ZUR FÖRDERUNG DER ANGEWANDTEN FORSCHUNG E.V. et al</b>		

1. The applicant is hereby informed that the International Bureau has, according to Article 31(7), notified each of the following Offices of its election:

EP :AT,BE,CH,CY,DE,DK,ES,FI,FR,GB,GR,IE,IT,LU,MC,NL,PT,SE  
 National :CA,JP,US

2. The following Offices have waived the requirement for the notification of their election; the notification will be sent to them by the International Bureau only upon their request:

National :GB,IN

3. The applicant is reminded that he must enter the "national phase" **before the expiration of 30 months from the priority date** before each of the Offices listed above. This must be done by paying the national fee(s) and furnishing, if prescribed, a translation of the international application (Article 39(1)(a)), as well as, where applicable, by furnishing a translation of any annexes of the international preliminary examination report (Article 36(3)(b) and Rule 74.1).

Some offices have fixed time limits expiring later than the above-mentioned time limit. For detailed information about the applicable time limits and the acts to be performed upon entry into the national phase before a particular Office, see Volume II of the PCT Applicant's Guide.

The entry into the European regional phase is postponed until **31 months from the priority date** for all States designated for the purposes of obtaining a European patent.

The International Bureau of WIPO  
 34, chemin des Colombettes  
 1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer:

C. Cupello



Telephone No. (41-22) 338.83.38

## PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING  
OF A CHANGE(PCT Rule 92bis.1 and  
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

SCHOPPE, Fritz  
 Schoppe, Zimmermann & Stöckeler  
 P.O. Box 71 08 67  
 81458 Munich  
 ALLEMAGNE

Date of mailing (day/month/year) 20 November 2000 (20.11.00)	
Applicant's or agent's file reference FH990302PCT	<b>IMPORTANT NOTIFICATION</b>
International application No. PCT/EP99/01721	International filing date (day/month/year) 16 March 1999 (16.03.99)

1. The following indications appeared on record concerning: <input type="checkbox"/> the applicant <input type="checkbox"/> the inventor <input checked="" type="checkbox"/> the agent <input type="checkbox"/> the common representative				
Name and Address  SCHOPPE, Fritz Patentanwälte Schoppe & Zimmermann Postfach 71 08 67 D-81458 München Germany	State of Nationality		State of Residence	
	Telephone No. 089/790 44 50			
	Facsimile No. 089/790 22 15			
	Teleprinter No.			
2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning: <input type="checkbox"/> the person <input type="checkbox"/> the name <input checked="" type="checkbox"/> the address <input type="checkbox"/> the nationality <input type="checkbox"/> the residence				
Name and Address  SCHOPPE, Fritz Schoppe, Zimmermann & Stöckeler P.O. Box 71 08 67 81458 Munich Germany	State of Nationality		State of Residence	
	Telephone No. 089/790 44 50			
	Facsimile No. 089/790 22 15			
	Teleprinter No.			
3. Further observations, if necessary: <b>The new agent's address on the Demand has been considered as a change under Rule 92bis. In case of disagreement, the International Bureau should be notified immediately.</b>				
4. A copy of this notification has been sent to: <input checked="" type="checkbox"/> the receiving Office <input type="checkbox"/> the designated Offices concerned <input type="checkbox"/> the International Searching Authority <input checked="" type="checkbox"/> the elected Offices concerned <input checked="" type="checkbox"/> the International Preliminary Examining Authority <input type="checkbox"/> other:				

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland  Facsimile No.: (41-22) 740.14.35	Authorized officer  C. Cupello  Telephone No.: (41-22) 338.83.38
---	--

## PATENT COOPERATION TREATY

PCT

NOTIFICATION OF RECEIPT OF  
RECORD COPY

(PCT Rule 24.2(a))

From the INTERNATIONAL BUREAU

To:

SCHOPPE, Fritz  
 Patentanwälte Schoppe & Zimmermann  
 Postfach 71 08 67  
 D-81458 München  
 ALLEMAGNE

Date of mailing (day/month/year)  
 28 May 1999 (28.05.99)

## IMPORTANT NOTIFICATION

Applicant's or agent's file reference  
 FH990302PCT

International application No.  
 PCT/EP99/01721

The applicant is hereby notified that the International Bureau has received the record copy of the international application as detailed below.

Name(s) of the applicant(s) and State(s) for which they are applicants:

FRAUNHOFER-GESELLSCHAFT ZUR FÖRDERUNG DER ANGEWANDTEN FORSCHUNG E.V. (for all designated States except US)  
 EBERLEIN, Ernst et al (for US)

International filing date : 16 March 1999 (16.03.99)

Priority date(s) claimed :

Date of receipt of the record copy by the International Bureau : 14 May 1999 (14.05.99)

List of designated Offices :

EP :AT,BE,CH,CY,DE,DK,ES,FI,FR,GB,GR,IE,IT,LU,MC,NL,PT,SE  
 National :CA,GB,IN,JP,US

## ATTENTION

The applicant should carefully check the data appearing in this Notification. In case of any discrepancy between these data and the indications in the international application, the applicant should immediately inform the International Bureau.

In addition, the applicant's attention is drawn to the information contained in the Annex, relating to:

- time limits for entry into the national phase
- confirmation of precautionary designations
- requirements regarding priority documents

A copy of this Notification is being sent to the receiving Office and to the International Searching Authority.

The International Bureau of WIPO  
 34, chemin des Colombettes  
 1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer:

Marie-José Devillard

Telephone No. (41-22) 338.83.38

002642342

**INFORMATION ON TIME LIMITS FOR ENTERING THE NATIONAL PHASE**

The applicant is reminded that the "national phase" must be entered before each of the designated Offices indicated in the Notification of Receipt of Record Copy (Form PCT/IB/301) by paying national fees and furnishing translations, as prescribed by the applicable national laws.

The time limit for performing these procedural acts is **20 MONTHS** from the priority date or, for those designated States which the applicant elects in a demand for international preliminary examination or in a later election, **30 MONTHS** from the priority date, provided that the election is made before the expiration of 19 months from the priority date. Some designated (or elected) Offices have fixed time limits which expire even later than 20 or 30 months from the priority date. In other Offices an extension of time or grace period, in some cases upon payment of an additional fee, is available.

In addition to these procedural acts, the applicant may also have to comply with other special requirements applicable in certain Offices. It is the applicant's responsibility to ensure that the necessary steps to enter the national phase are taken in a timely fashion. Most designated Offices do not issue reminders to applicants in connection with the entry into the national phase.

**For detailed information about the procedural acts to be performed to enter the national phase before each designated Office, the applicable time limits and possible extensions of time or grace periods, and any other requirements, see the relevant Chapters of Volume II of the PCT Applicant's Guide. Information about the requirements for filing a demand for international preliminary examination is set out in Chapter IX of Volume I of the PCT Applicant's Guide.**

GR and ES became bound by PCT Chapter II on 7 September 1996 and 6 September 1997, respectively, and may, therefore, be elected in a demand or a later election filed on or after 7 September 1996 and 6 September 1997, respectively, regardless of the filing date of the international application. (See second paragraph above.)

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

**CONFIRMATION OF PRECAUTIONARY DESIGNATIONS**

This notification lists only specific designations made under Rule 4.9(a) in the request. It is important to check that these designations are correct. Errors in designations can be corrected where precautionary designations have been made under Rule 4.9(b). The applicant is hereby reminded that any precautionary designations may be confirmed according to Rule 4.9(c) before the expiration of 15 months from the priority date. If it is not confirmed, it will automatically be regarded as withdrawn by the applicant. There will be no reminder and no invitation. Confirmation of a designation consists of the filing of a notice specifying the designated State concerned (with an indication of the kind of protection or treatment desired) and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.

**REQUIREMENTS REGARDING PRIORITY DOCUMENTS**

For applicants who have not yet complied with the requirements regarding priority documents, the following is recalled.

Where the priority of an earlier national, regional or international application is claimed, the applicant must submit a copy of the said earlier application, certified by the authority with which it was filed ("the priority document") to the receiving Office (which will transmit it to the International Bureau) or directly to the International Bureau, before the expiration of 16 months from the priority date, provided that any such priority document may still be submitted to the International Bureau before that date of international publication of the international application, in which case that document will be considered to have been received by the International Bureau on the last day of the 16-month time limit (Rule 17.1(a)).

Where the priority document is issued by the receiving Office, the applicant may, instead of submitting the priority document, request the receiving Office to prepare and transmit the priority document to the International Bureau. Such request must be made before the expiration of the 16-month time limit and may be subjected by the receiving Office to the payment of a fee (Rule 17.1(b)).

If the priority document concerned is not submitted to the International Bureau or if the request to the receiving Office to prepare and transmit the priority document has not been made (and the corresponding fee, if any, paid) within the applicable time limit indicated under the preceding paragraphs, any designated State may disregard the priority claim, provided that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity to furnish the priority document within a time limit which is reasonable under the circumstances.

Where several priorities are claimed, the priority date to be considered for the purposes of computing the 16-month time limit is the filing date of the earliest application whose priority is claimed.

# PCT

## REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

International Application No.

International Filing Date

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference  
(if desired) (12 characters maximum) FH990302PCT

**Box No. I TITLE OF INVENTION** Repeater System and Method of Receiving a Modulated Input Signal and Transmitting a Modulated Output Signal

**Box No. II APPLICANT**

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

Fraunhofer-Gesellschaft zur  
Förderung der angewandten  
Forschung e. V.  
Leonrodstraße 54  
D-80636 München  
DE

This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (that is, country) of nationality:

DE

State (that is, country) of residence:

DE

This person is applicant

all designated  
States

all designated States except  
the United States of America

the United States  
of America only

the States indicated in  
the Supplemental Box

**Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)**

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

EBERLEIN, Ernst  
Waldstr. 28 B  
D-91091 Großenseebach  
DE

This person is:

applicant only

applicant and inventor

inventor only (If this check-box  
is marked, do not fill in below.)

State (that is, country) of nationality:

DE

State (that is, country) of residence:

DE

This person is applicant

all designated  
States

all designated States except  
the United States of America

the United States  
of America only

the States indicated in  
the Supplemental Box

Further applicants and/or (further) inventors are indicated on a continuation sheet.

**Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE**

The person identified below is hereby/has been appointed to act on behalf  
of the applicant(s) before the competent International Authorities as:

agent

common representative

Name and address: (Family name followed by given name; for a legal entity, full official  
designation. The address must include postal code and name of country.)

SCHOPPE, Fritz  
Patentanwälte Schoppe & Zimmermann  
Postfach 71 08 67  
D-81458 München  
DE

Telephone No.

089/790 44 50

Facsimile No.

089/790 22 15

Teleprinter No.

**Address for correspondence:** Mark this check-box where no agent or common representative is/has been appointed and the  
space above is used instead to indicate a special address to which correspondence should be sent.

## Continuation of Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

*If none of the following sub-boxes is used, this sheet should not be included in the request.*

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

BERNHARD, Josef  
Werner-von-Siemens Straße 141  
D-91052 Erlangen  
DE

This person is:

applicant only  
 applicant and inventor  
 inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:  
DE

State (that is, country) of residence:  
DE

This person is applicant for the purposes of:  all designated States  all designated States except the United States of America  the United States of America only  the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

PAUL, Christian  
Engelstr. 20  
D-91054 Erlangen  
DE

This person is:

applicant only  
 applicant and inventor  
 inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:  
DE

State (that is, country) of residence:  
DE

This person is applicant for the purposes of:  all designated States  all designated States except the United States of America  the United States of America only  the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

VON DER GRÜN, Thomas  
Kirchäckerweg 10  
D-91077 Kleinsendelbach  
DE

This person is:

applicant only  
 applicant and inventor  
 inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:  
DE

State (that is, country) of residence:  
DE

This person is applicant for the purposes of:  all designated States  all designated States except the United States of America  the United States of America only  the States indicated in the Supplemental Box

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

applicant only  
 applicant and inventor  
 inventor only (If this check-box is marked, do not fill in below.)

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:  all designated States  all designated States except the United States of America  the United States of America only  the States indicated in the Supplemental Box

Further applicants and/or (further) inventors are indicated on another continuation sheet.

## Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

## Regional Patent

AP ARIPO Patent: GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT

EA Eurasian Patent: AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT

EP European Patent: AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT

OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line) .....

## National Patent (if other kind of protection or treatment desired, specify on dotted line):

<input type="checkbox"/> AL Albania .....	<input type="checkbox"/> LS Lesotho .....
<input type="checkbox"/> AM Armenia .....	<input type="checkbox"/> LT Lithuania .....
<input type="checkbox"/> AT Austria .....	<input type="checkbox"/> LU Luxembourg .....
<input type="checkbox"/> AU Australia .....	<input type="checkbox"/> LV Latvia .....
<input type="checkbox"/> AZ Azerbaijan .....	<input type="checkbox"/> MD Republic of Moldova .....
<input type="checkbox"/> BA Bosnia and Herzegovina .....	<input type="checkbox"/> MG Madagascar .....
<input type="checkbox"/> BB Barbados .....	<input type="checkbox"/> MK The former Yugoslav Republic of Macedonia .....
<input type="checkbox"/> BG Bulgaria .....	<input type="checkbox"/> .....
<input type="checkbox"/> BR Brazil .....	<input type="checkbox"/> MN Mongolia .....
<input type="checkbox"/> BY Belarus .....	<input type="checkbox"/> MW Malawi .....
<input checked="" type="checkbox"/> CA Canada .....	<input type="checkbox"/> MX Mexico .....
<input type="checkbox"/> CH and LI Switzerland and Liechtenstein .....	<input type="checkbox"/> NO Norway .....
<input type="checkbox"/> CN China .....	<input type="checkbox"/> NZ New Zealand .....
<input type="checkbox"/> CU Cuba .....	<input type="checkbox"/> PL Poland .....
<input type="checkbox"/> CZ Czech Republic .....	<input type="checkbox"/> PT Portugal .....
<input type="checkbox"/> DE Germany .....	<input type="checkbox"/> RO Romania .....
<input type="checkbox"/> DK Denmark .....	<input type="checkbox"/> RU Russian Federation .....
<input type="checkbox"/> EE Estonia .....	<input type="checkbox"/> SD Sudan .....
<input type="checkbox"/> ES Spain .....	<input type="checkbox"/> SE Sweden .....
<input type="checkbox"/> FI Finland .....	<input type="checkbox"/> SG Singapore .....
<input checked="" type="checkbox"/> GB United Kingdom .....	<input type="checkbox"/> SI Slovenia .....
<input type="checkbox"/> GE Georgia .....	<input type="checkbox"/> SK Slovakia .....
<input type="checkbox"/> GH Ghana .....	<input type="checkbox"/> SL Sierra Leone .....
<input type="checkbox"/> GM Gambia .....	<input type="checkbox"/> TJ Tajikistan .....
<input type="checkbox"/> GW Guinea-Bissau .....	<input type="checkbox"/> TM Turkmenistan .....
<input type="checkbox"/> HR Croatia .....	<input type="checkbox"/> TR Turkey .....
<input type="checkbox"/> HU Hungary .....	<input type="checkbox"/> TT Trinidad and Tobago .....
<input type="checkbox"/> ID Indonesia .....	<input type="checkbox"/> UA Ukraine .....
<input type="checkbox"/> IL Israel .....	<input type="checkbox"/> UG Uganda .....
<input type="checkbox"/> IS Iceland .....	<input checked="" type="checkbox"/> US United States of America .....
<input checked="" type="checkbox"/> JP Japan .....	<input type="checkbox"/> .....
<input type="checkbox"/> KE Kenya .....	<input type="checkbox"/> UZ Uzbekistan .....
<input type="checkbox"/> KG Kyrgyzstan .....	<input type="checkbox"/> VN Viet Nam .....
<input type="checkbox"/> KP Democratic People's Republic of Korea .....	<input type="checkbox"/> YU Yugoslavia .....
<input type="checkbox"/> KR Republic of Korea .....	<input type="checkbox"/> ZW Zimbabwe .....
<input type="checkbox"/> KZ Kazakhstan .....	
<input type="checkbox"/> LC Saint Lucia .....	
<input type="checkbox"/> LK Sri Lanka .....	
<input type="checkbox"/> LR Liberia .....	

Check-boxes reserved for designating States (for the purposes of a national patent) which have become party to the PCT after issuance of this sheet:

IN India .....

.....

**Precautionary Designation Statement:** In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

## Box No. VI PRIORITY CLAIM

 Further priority claims are indicated in the Supplemental Box.

Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		national application: country	regional application:* regional Office	international application: receiving Office
item (1)				
item (2)				
item (3)				

The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s):

\* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris Convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See Supplemental Box.

## Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA)  
(if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):

ISA /

Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):

Date (day/month/year)

Number

Country (or regional Office)

## Box No. VIII CHECK LIST; LANGUAGE OF FILING

This international application contains the following number of sheets:

request : 4

description (excluding sequence listing part) : 17

claims : 7

abstract : 1

drawings : 3

sequence listing part of description : \_\_\_\_\_

Total number of sheets : 32

This international application is accompanied by the item(s) marked below:

- fee calculation sheet
- separate signed power of attorney
- copy of general power of attorney; reference number, if any: 17406
- statement explaining lack of signature
- priority document(s) identified in Box No. VI as item(s):
- translation of international application into (language):
- separate indications concerning organism or other biological material in computer readable form
- nucleotide and/or other (specify):
- other (specify):

Figure of the drawings which should accompany the abstract: 1

Language  
international

## Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which he or she is signing.

March 16, 1999



SCHOPPE, KITZ

For receiving Office use only

1. Date of actual receipt of the purported international application:

3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:

4. Date of timely receipt of the required corrections under PCT Article 11(2):

5. International Searching Authority (if two or more are competent): ISA /

6.  Transmittal of search copy delayed until search fee is paid.

2. Drawings:

 received: not received:

For International Bureau use only

Date of receipt of the record copy by the International Bureau:



PATENT COOPERATION TREATY

From the  
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

SCHOPPE, Fritz  
SCHOPPE, ZIMMERMANN & STÖCKELER  
Postfach 71 08 67  
81458 München  
ALLEMAGNE

1

JUNI 2001

NOTIFICATION OF TRANSMITTAL OF  
THE INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing (day/month/year)	08.06.2001
-------------------------------------	------------

Applicant's or agent's file reference  
FH990302PCT

IMPORTANT NOTIFICATION

International application No. PCT/EP99/01721	International filing date (day/month/year) 16/03/1999	Priority date (day/month/year) 16/03/1999
---	--	--

Applicant  
FRAUNHOFER-GESELLSCHAFT ZUR FÖRDERUNG..et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

**4. REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

Name and mailing address of the IPEA/

European Patent Office  
D-80298 Munich  
Tel. +49 89 2399 - 0 Tx: 523656 epmu d  
Fax: +49 89 2399 - 4465

Authorized officer

Cornudet-Henschel, V  
Tel.+49 89 2399-7371



# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference FH990302PCT	<b>FOR FURTHER ACTION</b>		See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/EP99/01721	International filing date (day/month/year) 16/03/1999	Priority date (day/month/year) 16/03/1999	
International Patent Classification (IPC) or national classification and IPC H04H3/00			
Applicant FRAUNHOFER-GESELLSCHAFT ZUR FÖRDERUNG..et al.			

<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 10 sheets.</p>
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> <li>I <input checked="" type="checkbox"/> Basis of the report</li> <li>II <input type="checkbox"/> Priority</li> <li>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li> <li>IV <input type="checkbox"/> Lack of unity of invention</li> <li>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li> <li>VI <input type="checkbox"/> Certain documents cited</li> <li>VII <input type="checkbox"/> Certain defects in the international application</li> <li>VIII <input type="checkbox"/> Certain observations on the international application</li> </ul>

Date of submission of the demand 13/09/2000	Date of completion of this report 08.06.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Tillgren, M Telephone No. +49 89 2399 7497



INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT

International application No. PCT/EP99/01721

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, pages:**

1-4,6-17 as originally filed

5,5a-5b as received on 24/04/2001 with letter of 24/04/2001

**Claims, No.:**

1-16 as received on 24/04/2001 with letter of 24/04/2001

**Drawings, No.:**

1-5 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/EP99/01721

the description,      pages:  
 the claims,      Nos.:  
 the drawings,      sheets:

5.  This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):  
*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes:	Claims	1-16
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-16
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-16
	No:	Claims	

2. Citations and explanations  
see separate sheet

Re Item V

- 1) With regard to present **claim 1** the document US-A-5 107 488, which is considered to be closest prior art and which is hereinafter referred to as D1, discloses a repeater system for receiving a modulated input signal and for transmitting a modulated output signal (abstract), comprising a clock oscillator for providing a repeater system clock (column 3, lines 19-29 and fig. 1), a demodulator for demodulating an input signal to obtain a demodulated signal, the input signal being the modulated input signal or a signal derived from the modulated input signal (column 3, lines 6-18), a modulator for modulating the demodulated signal to obtain a modulated signal, the modulated signal being the modulated output signal or a signal from which the modulated output signal is derived (column 3 and fig. 1),

The main differences between the system according to claim 1 and that of D1 is that there are no controllable oscillators disclosed in D1, neither any feed-back circuits for the control of these oscillators. The objective problem to be solved is thus how to construct a repeater with can operate driven by clock circuits with a lower precision and thus incurs a lower cost. This is solved by the use of the controllable oscillators together with the feed-back circuits. There is no indication of such a solution in any of the prior art, and claim 1 is therefore considered to be novel and inventive.

Hence claim 1 does fulfill the requirements of Article 33(2)-(4) PCT.

- 2) The subject matter of **independent claim 16** is the same as the subject matter of claim 1, however expressed as method features. Therefore claim 16 also fulfills the requirements of Article 33(2)-(4) PCT.
- 3) The dependent claims 2-15 fulfill, due to their dependencies, the requirements of Article 33(2)-(4) PCT.

- 5 -

Another disadvantage of OCXOs or a GPS hardware is that space requirement for the repeater system are high, in particular, when an oven has to be added to the repeater system.

~~It is the object of the present invention to provide an economical and reliable repeater concept.~~

This object is met by a repeater system in accordance with claim 1 and by a method of receiving a modulated input signal and of transmitting a modulated output signal in accordance with claim 16.

The present invention is based on the realisation that a super stable reference source can be dispensed for, because the satellite signal itself, which has a defined frequency, can be used for controlling the repeater output frequency. Thus, a quite inaccurate repeater system clock, which is inexpensive compared to super stable reference sources, can be used. The repeater system clock error is, however, computed using the received satellite signal and is compensated for. Thus, the repeater system in accordance with the present invention is synchronized to the satellite as an external reference.

The inventive concept can be implemented with minimum extra costs, since a relatively less accurate reference clock, for example 20 ppm, can be used as clock oscillator for providing the repeater system clock source. All system components influencing the frequency of the repeater system output signal are required to use the same repeater system clock. In the demodulator, a controllable oscillator connected to a local oscillator port of a mixer is arranged for providing an output signal which is derived from the repeater system clock. A feedback means connected to the mixer output and the control input of the controllable oscillator is used for determining a control value which is applied to the controllable oscillator. This control value

- 5a -

U.S. Patent No. 5,107,488 discloses a circuit arrangement for switching a digital service channel through a radio relay repeater. The circuit arrangement includes a receiving antenna connected to a receiver. At the output of the receiver, the received signal has an intermediate frequency. The signal is input into a demodulator. The demodulated output signal is a base frequency signal. The base frequency signal is input into a modulator to generate an intermediate frequency signal which is up-converted by means of a transmitter and supplied to a transmitting antenna. The circuit arrangement additionally comprises a receive clock recovery circuit to recover a signal clock from the received signal. The recovered signal clock is input into the demodulator. In a through connection mode, the receiver clock is also input into a transmit clock generation circuit input into the modulator and the transmitter.

US-Patent No. 4,608,699 discloses a simulcast transmission system, in which a signal transmitted by a master station provides a reference frequency signal as well as a voice and data path. In particular, a 72 MHz signal is down converted and used for controlling a radio frequency voltage-controlled oscillator such that a 800 MHz output signal is generated which includes the data content of the 72 MHz signal.

page 5b ---->

- 5b-

~~Another disadvantage of OEXOS or a GPS hardware is that space requirement for the repeater system are high, in particular, when an oven has to be added to the repeater system.~~

It is the object of the present invention to provide an economical and reliable repeater concept.

This object is met by a repeater system in accordance with claim 1 and by a method of receiving a modulated input signal and of transmitting a modulated output signal in accordance with claim 16.

The present invention is based on the realisation that a super stable reference source can be dispensed for, because the satellite signal itself, which has a defined frequency, can be used for controlling the repeater output frequency. Thus, a quite inaccurate repeater system clock, which is inexpensive compared to super stable reference sources, can be used. The repeater system clock error is, however, computed using the received satellite signal and is compensated for. Thus, the repeater system in accordance with the present invention is synchronized to the satellite as an external reference.

The inventive concept can be implemented with minimum extra costs, since a relatively less accurate reference clock, for example 20 ppm, can be used as clock oscillator for providing the repeater system clock source. All system components influencing the frequency of the repeater system output signal are required to use the same repeater system clock. In the demodulator, a controllable oscillator connected to a local oscillator port of a mixer is arranged for providing an output signal which is derived from the repeater system clock. A feedback means connected to the mixer output and the control input of the controllable oscillator is used for determining a control value which is applied to the controllable oscillator. This control value

Claims

1. A repeater system (10) for receiving a modulated input signal and for transmitting a modulated output signal, comprising:

a clock oscillator (34) for providing a repeater system clock ( $f_{CLK}$ );

a demodulator (12) for demodulating an input signal to obtain a demodulated signal, the input signal being the modulated input signal or a signal derived from the modulated input signal, the demodulator (12) including:

a first mixer (28) which is arranged for receiving the input signal[:] at an input port (28a), the first mixer additionally having a local oscillator port (28c) and an output port (28b);

a first controllable oscillator (30) connected to [a] the local oscillator port (28c) of the first mixer (28), the first controllable oscillator (30) being arranged for providing an output signal which is derived from the repeater system clock ( $f_{CLK}$ )[:];

feedback means (32) having a first input for receiving a frequency of the signal at the output port (28b) of the first mixer (28) as an actual value and a second input for receiving a desired value for the frequency of the signal at the output port (28b) of the first mixer (28), the feedback means (32) being arranged for determining a first control value ( $CV_1$ ), which is applied to the controllable first oscillator (30), the control value ( $CV_1$ ) being determined such that the [frequency of a signal at the output port (28b) of the first mixer (28)] actual value approaches [a] the desired value;

- 2 -

a modulator (14) for modulating the demodulated signal to obtain a modulated signal, the modulated signal being the modulated output signal or a signal from which the modulated output signal is derived, including:

a second mixer (38) which is arranged for receiving the demodulated signal at an input port (38a) and for providing the modulated output signal at an output port (38b);

a second controllable oscillator (36) connected to the local oscillator port (38c) of the second mixer (38), the second controllable oscillator (36) being arranged for providing an output signal which is derived from the repeater system clock ( $f_{CLK}$ ), the second oscillator (36) being controlled by a second control value ( $CV_2$ ); and

a controller (40) for receiving the first control value ( $CV_1$ ) and for providing the second control value ( $CV_2$ ), the controller being arranged for determining the second control value ( $CV_2$ ) on the basis of the first control value ( $CV_1$ ) and a predetermined value of the frequency of the modulated output signal such that the frequency ( $f_{OUT}$ ) of the modulated output signal approaches [a] the predetermined value.

2. The repeater system of claim 1, which is arranged for receiving the modulated input signal, which frequency is higher than a predetermined demodulator (12) [operating] input frequency, the repeater system (10) further comprising:

a tuner (18) for down-converting the modulated input signal to obtain a modulated intermediate frequency signal forming the demodulator (12) input signal, the tuner (18) being arranged for using a tuner oscillator signal, which is derived from the repeater system clock

- 3 -

( $f_{CLK}$ ), and

wherein the controller (14) is arranged for determining the second control value ( $CV_2$ ) further on the basis of the ratio of the modulated input signal frequency ( $f_{IN}$ ) and the repeater system clock frequency ( $f_{CLK}$ ).

3. The repeater system of claim 1 or claim 2, which is arranged for transmitting the modulated output signal, which frequency is higher than a predetermined modulator (14) [operating] output frequency, the repeater system (10) further comprising:

an up-converter (22) for up-converting the modulated signal to obtain the modulated output signal, the up-converter (22) using an converter oscillator signal which is derived from the repeater system clock ( $f_{CLK}$ ), and

wherein the controller (40) is arranged for determining the second control value ( $CV_2$ ) further on the basis of the ratio of the frequency ( $f_{OUT}$ ) of the modulated output signal and the repeater system clock frequency ( $f_{CLK}$ ).

4. The repeater system of any of the claims 1 to 3, further comprising an analog/digital converter (50) having its output connected to the demodulator (12) for providing digital demodulator input signal.
5. The repeater system of any one of the preceding claims, wherein the modulated signal has been modulated by a complex I/Q modulation technique.
6. The repeater system of claim 4 or claim 5, wherein the first and second controllable oscillators (30,36) are numerically controlled oscillators, each numerically controlled oscillator having:

- 4 -

a n-bit phase accumulator (60); and

a sine/cosine lookup table (62) for outputting a sine signal and a cosine signal, the frequencies thereof being determined by the first and second control values ( $CV_1, CV_2$ ), respectively, each control value being determined by the ratio of a respective increment ( $I_Q, I_M$ ) and a respective table length ( $T_Q, T_M$ ) of the respective lookup tables (62).

7. The repeater system of claim 6, wherein the first mixer (28) is a complex multiplier receiving at its local oscillator port (28c) the sine signal and the cosine signal output by the first numerically controlled oscillator (30), and outputting at its output port a complex signal having an in phase component (I) and an quadrature component (Q).
8. The repeater system (10) of claim 6 or claim 7, further comprising a decision stage (52) arranged for receiving at an input port thereof the I/Q components and outputting at an output thereof phase values on the basis of the I and Q components, these phase values representing the demodulated signal.
9. The repeater system (10) of claim 8, wherein the feedback means (32) comprises:

a phase discriminator (32a) arranged for receiving, as actual values, the I and Q components and, as desired values, the phase values output by the decision stage, and for outputting a phase difference between the actual values and the desired values; and

a loop filter (32b) for receiving the phase difference and for outputting the increment ( $I_Q$ ) for the first numerically controlled oscillator such that the output

- 5 -

frequency of the numerically controlled oscillator equals the frequency of the modulator input signal.

10. The repeater system (10) of any one of the preceding claims, wherein the feedback means (32) is arranged to determine the first control value such that the desired value is zero.
11. The repeater system (10) of any one of the preceding claims, wherein the demodulator (12) has a specified capture and tracking range and wherein the required accuracy of the clock oscillator (34) is determined by the specified capture and tracking range rather than by the required accuracy of the modulated output signal frequency ( $f_{OUT}$ ) of the repeater system (10).
12. The repeater system (10) of claim 1, wherein the controller is arranged for implementing the following equation for obtaining the second control value ( $CV_2$ ):

$$CV_2 = f_{OUT} \cdot CV_1 / f_{IN}$$

wherein  $f_{OUT}$  represents the modulated output signal frequency,  $f_{IN}$  represents the modulated input signal, and  $CV_1$  represents the first control value.

13. The repeater system (10) of claim 3 and claim 2, wherein the controller (40) is arranged for implementing the following equation for obtaining the second control value ( $CV_2$ ):

$$CV_2 = f_{OUT}/f_{IN} \cdot (a + CV_1) - d$$

wherein  $f_{OUT}$  represents the modulated output signal frequency,  $f_{IN}$  represents the modulated input signal frequency,  $CV_1$  represents the first control value,  $a$  represents a fixed ratio between the tuner oscillator frequency and the repeater system clock frequency, and  $d$

- 6 -

represents a fixed ratio between the modulated output signal frequency and a repeater system clock frequency.

14. The repeater system (10) of claim 7, wherein the table length of both numerically controlled oscillators (30,36) is 24 bits and wherein the multiplier (28) is a 10-bit multiplier.
15. The repeater system (10) of any of the preceding claims, which is adapted for receiving a satellite signal as the modulated input signal, and for transmitting the modulated output signal into a terrestrial single frequency network.
16. Method of receiving a modulated input signal and transmitting a modulated output signal, comprising the following steps:

providing a repeater system clock ( $f_{CLK}$ );

demodulating the modulated input signal or a signal which is derived from the modulated input signal, to obtain a demodulated signal wherein the step of demodulating comprises the following substeps:

mixing (28) the modulated signal or the signal derived from the modulated signal using an oscillator signal output by a first controllable oscillator (30), which output signal is derived from the repeater system clock ( $f_{CLK}$ ) to obtain a mixed signal;

on the basis of the frequency of the mixed signal as an actual value and a desired value for the frequency of the mixed signal, determining (40) a first control value ( $CV_1$ ) applied to the first controllable oscillator (30) such that the frequency of the mixed signal approaches [a] the desired value;

- 7 -

modulating (14) the demodulated signal to obtain the modulated output signal or a signal from which the modulated output signal is derived, wherein the step of demodulating comprises the following substeps:

mixing (38) the demodulated signal or a signal which is derived from the demodulated signal using an oscillator signal output by a second controllable oscillator (36) which output signal is derived from the repeater system clock ( $f_{CLK}$ );

determining (40) a second control value ( $CV_2$ ), on the basis of the first control value ( $CV_1$ ) and a predetermined value of the frequency of the modulated output signal, such that the frequency of the [demodulated] modulated output signal approaches a predetermined value; and

controlling the second controllable oscillator by applying the second control value ( $CV_2$ ) to the second controllable oscillator (36).

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:  
 SCHOPPE, ZIMMERMANN & STÖCKELER  
 Attn. Schoppe, F.  
 Postfach 71 08 67  
 D-81458 München  
 GERMANY

NOTIFICATION OF TRANSMITTAL OF  
THE INTERNATIONAL SEARCH REPORT  
OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference

FH990302PCT ✓

Date of mailing  
(day/month/year)

03/11/1999

International application No.

PCT/EP 99/01721 ✓

International filing date

16/03/1999 ✓

Applicant

FRAUNHOFER-GESELLSCHAFT ZUR FÖRDERUNG..et al. ✓

1.  The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

**Filing of amendments and statement under Article 19:**

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

**When?** The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

**Where?** Directly to the International Bureau of WIPO  
 34, chemin des Colombettes  
 1211 Geneva 20, Switzerland  
 Fascimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2.  The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3.  **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

Within **19 months** from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within **20 months** from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority

European Patent Office, P.B. 5818 Patentlaan 2  
 NL-2280 HV Rijswijk  
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
 Fax: (+31-70) 340-3016

Authorized officer

Liliane Van Velzen-Peron

## NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

### INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

#### What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

**When?** Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

#### Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been filed, see below.

**How?** Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

**The amendments must be made in the language in which the international application is to be published.**

#### What documents must/may accompany the amendments?

**Letter (Section 205(b)):**

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

**The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.**

## NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

**The following examples illustrate the manner in which amendments must be explained in the accompanying letter:**

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:  
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:  
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:  
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or  
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:  
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

### **"Statement under article 19(1)" (Rule 46.4)**

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

**It must be in the language in which the international application is to be published.**

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

### **Consequence if a demand for international preliminary examination has already been filed**

If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

### **Consequence with regard to translation of the international application for entry into the national phase**

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

PATENT COOPERATION TREATY  
PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>FH990302PCT</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/EP 99/01721</b>	International filing date (day/month/year) <b>16/03/1999</b>	(Earliest) Priority Date (day/month/year)
Applicant <b>FRAUNHOFER-GESELLSCHAFT ZUR FÖRDERUNG...et al.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

contained in the international application in written form.

filed together with the international application in computer readable form.

furnished subsequently to this Authority in written form.

furnished subsequently to this Authority in computer readable form.

the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2.  Certain claims were found unsearchable (See Box I).

3.  Unity of invention is lacking (see Box II).

4. With regard to the **title**,

the text is approved as submitted by the applicant.

the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

the text is approved as submitted by the applicant.

the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

as suggested by the applicant.

because the applicant failed to suggest a figure.

because this figure better characterizes the invention.

1

None of the figures.

## INTERNATIONAL SEARCH REPORT

International Application No

PCT 99/01721

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 7 H04H3/00 H04B7/155

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04H H04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 608 699 A (BATLIVALA PERCY P ET AL) 26 August 1986 (1986-08-26) column 1, line 13-32 column 1, line 51 -column 2, line 29 column 2, line 57 -column 3, line 26 column 5, line 12 -column 6, line 44 figures 1,4 claims ---	1,16
A	US 5 107 488 A (SCHREDER WOLFGANG ET AL) 21 April 1992 (1992-04-21) abstract column 1, line 13-17 column 1, line 56 -column 2, line 11 column 3, line 6-43 figure 1 --- -/-	1,16

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

## ° Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

Date of mailing of the international search report

22 October 1999

03/11/1999

Name and mailing address of the ISA  
 European Patent Office, P.B. 5818 Patentlaan 2  
 NL - 2280 HV Rijswijk  
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl.  
 Fax: (+31-70) 340-3016

Authorized officer

Dejonghe, O

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/99/01721

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 010 317 A (KUZNICKI WILLIAM J ET AL) 23 April 1991 (1991-04-23) abstract column 1, line 14-54 column 2, line 48 -column 3, line 7 column 7, line 46 -column 8, line 15 figures 2,7 -----	1,15

## INTERNATIONAL SEARCH REPORT

Information on family members

International Application No

PCT/99/01721

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US 4608699	A 26-08-1986	NONE		
US 5107488	A 21-04-1992	DE 3924283 A		31-01-1991
		DE 59007819 D		12-01-1995
		EP 0410266 A		30-01-1991
		ES 2067599 T		01-04-1995
US 5010317	A 23-04-1991	AT 167606 T		15-07-1998
		CA 2045693 A,C		31-05-1991
		DE 69032430 D		23-07-1998
		DE 69032430 T		03-12-1998
		DK 138491 A		23-07-1991
		EP 0502977 A		16-09-1992
		FI 101444 B		15-06-1998
		JP 2689730 B		10-12-1997
		JP 5504241 T		01-07-1993
		KR 9500675 B		27-01-1995
		NO 306190 B		27-09-1999
		WO 9108652 A		13-06-1991

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:  
**SCHOPPE & ZIMMERMANN**  
 Attn. Schoppe, F.  
 Postfach 71 08 67  
 D-81458 München  
 GERMANY

**PCT**

**NOTIFICATION OF RECEIPT  
OF SEARCH COPY**

(PCT Rule 25.1)

Date of mailing  
(day/month/year)

07/06/1999

Applicant's or agent's file reference  
**FH990302PCT**

**IMPORTANT NOTIFICATION**

International application No.  
**PCT/EP 99/01721**

International filing date (day/month/year)  
**16/03/1999**

Priority date (day/month/year)

Applicant

**FRAUNHOFER-GESELLSCHAFT ZUR FÖRDERUNG..et al.**

**1. Where the International Searching Authority and the Receiving Office are not the same office:**

The applicant is hereby notified that the search copy of the international application was received by this International Searching Authority on the date indicated below.

**Where the International Searching Authority and the Receiving Office are the same office:**

The applicant is hereby notified that the search copy of the international application was received on the date indicated below.

10/05/1999 (date of receipt).

**2.  The search copy was accompanied by a nucleotide and/or amino acid sequence listing in computer readable form.**

**3. Time limit for establishment of International Search Report**

The applicant is informed that the time limit for establishing the International Search Report is 3 months from the date of receipt indicated above or 9 months from the priority date, whichever time limit expires later

**4. A copy of this notification has been sent to the International Bureau and, where the first sentence of paragraph 1 applies, to the Receiving Office.**

Name and mailing address of the International Searching Authority  
  
 European Patent Office, P.B. 5818 Patentlaan 2  
 NL-2280 HV Rijswijk  
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
 Fax: (+31-70) 340-3016

Authorized officer

**ISA/EP**